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BUILDING MATERIALS AND TECHNIQUES
IN COMMUNIST CHINA

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FOREWORD

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BUILDING MATERIALS AND TECHNIQUES
IN COMMUNIST CHINA

[Following are selected extracts from
Kung-ch'eng Chien-she (Engineering
Construction), published in Peiping
and dated Number 9, 15 May 1960.]

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THOUSAND-PLATE SHALE [CONVERTED TO] LIGHT-
WEIGHT LARGE MASSES

[Following is the translation of an article written by Wen Hsiang-jui, in Kung-ch'eng Chien-she (Engineering Construction), Peiping, No. 9, 15 May 1960, page 6.]

The No. 6 Building-Construction Company in Shansi Province has made use of very rich thousand-plate shale deposits. The shale is broken into small pieces and put into a maul, which is made up of heat-resisting bricks. Then the shale is placed in a subterranean kiln, where it is baked under 1,300-1,500°C temperatures. After baking, the shale has expanded into a large light-weight mass, with a volume weight of 200-500 kilograms per cubic meter. Its pressure resistance is 20-100 kilograms per square centimeter. The merits of shale are: easy access to raw materials, simple equipment and simple techniques, low production cost, light-weight, high strength, heat resisting, sound-proof, acid-proof, water-proof and anti-penetration. Accordingly, the shale not only can be made into large pieces as panels but also used as excellent heat-resisting and sound-proof materials.

After a half year of experimenting, the Building-Construction Company, by May 1960, had succeeded in the experiment of making light-weight thousand-plate shale and continued to build subterranean kilns, with increased production efficiency. Now, the shale has been formally put into production which is being expanded.

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NEW EXPERIENCES IN CAISSON SINKING

[Following is the translation of an extract from an article written by the Mechanical Construction Company, Building-Construction Ministry, in Kung-ch'eng Chien-she (Engineering Construction), Peiping, No. 9, 15 May 1960, page 7.]

A pile group foundation is used at a certain engineering project where the soil is a soft plastic siliceous clay. The main part of the structure uses the coffer-dam artificial island ground built pneumatic caisson is 2.40 meters high. Beginning with the second stage of caisson sinking, excavation is done by hydraulic power. The average daily sinking is 0.42 meter. The sinking rate is twice as fast as that in the first stage when excavation was done by manual labor.

A caisson whose surface is about 600-700 square meters, under general conditions when excavation is done manually, requires a shift of 60 workers to work inside the caisson chamber and 114 men working on the outside to move the earth away. But when hydraulic power is used for excavation, only 12 men are needed to work in the chamber and none on the outside. The cost of sink one meter by hydraulic power excavation has been calculated at 10,463 yuan, manual power excavation at 19,504 yuan (neither include the cost of preparations before and after sinking); the former method can save 46% of engineering cost. This is an important technical reform in caisson sinking and has met the rapid and economical requirements of construction policy. This method also encourages caisson engineering to become all-out mechanization and automation, to avoid the threat of occupational illnesses and to open a path for the development of new technique by which the blind-type caisson without man may be realized.

EXPERIENCES IN ACID-PROOF SAND CUSHION CONSTRUCTION

[Following is the translation of an extract from an article written by P'an Li-li, in Kung-ch'eng Chien-she (Engineering Construction), Peiping, No 9, 15 May 1960, page 23.]

In a workshop of a certain large project a large-scale sand cushion construction of special specifications has been recently completed. The formation of this sand cushion is 2,000 cubic meters (total volume), 50 centimeters thick, and is topped by a reinforced concrete raft foundation. This cushion is designed to be the cushion of the foundation. Its functions are: (1) to be an acid-proof cushion for the foundation; (2) to drain off water easily, especially to allow acid solution to soak through rapidly; (3) as the sub-soil is very bad, this sand cushion can decrease or eliminate the uneven settlement of the foundation.

Because of the limitations implied in these three factors, the materials selected for the construction of this sand cushion must meet such qualifications as: acid-proof (must be tested) medium sand or coarse sand, containing 8-12% water, a strong pressure resistance that will sustain 2.5 kilograms per square centimeter.

In accordance with design requirements, the construction unit has adopted a series of measures that have guaranteed quality and development, and has achieved all-out fulfillment in this engineering project, which has received favorable comments from building and planning units.

PRACTICAL APPLICATION OF BUILDING SETTLEMENT SURVEYING METHOD

[Following is the translation of an extract from an article written by the Foundation Research Division, Building Research Institute, Building-Construction Ministry, in Kung-sh'eng Chien-she (Engineering Construction), Peiping, No 9, 15 May 1960, page 25.]

The Importance of Building Settlement Surveying

Along with the development of China's socialist construction, the scope of capital construction has become greater and greater, its content has become more complicated, so the demand for foundation planning and construction has risen higher and higher. Accordingly, building settlement surveying has also become a necessary activity in construction. During construction, surveying activity will give direct guidance to production. In the process of construction and application, settlement surveying can clearly point out the degree of settlement development and the danger involved so that immediate preventive measures can be taken.

Building settlement surveying not only can provide inspection of construction quality and the degree of reliability of geological survey data, but can also test and prove the accuracy of foundation calculation and planning of the structure resting on the foundation. Settlement surveying will supply a great quantity of accurate data for the advancement of soil mechanics theories and for the improvement of foundation planning methods.

However, such surveying activity has always been neglected; as a result, when accidents occur, the causes have been frequently very difficult to ascertain.

DETERMINING WATER CONTENT IN SOIL BY EVAPORATION-
CONDENSATION METHOD

[Following is the translation of an article written by T'ang Chia-hung, in Kung-ch'eng Chien-she (Engineering Construction), Peiping, No 9, 15 May 1960, page 29.]

The most common methods used to determine water content in soil are the baking box drying method, the alcohol burning method, and the ultra-red ray illuminating method. The baking box drying method and the ultra-red ray illuminating method have a relatively better accuracy. Of these two methods, the ultra-red ray illuminating method is the fastest, but its equipment is more complicated. This method requires a baking box, electricity, and complete sets of analytical scales.

The baking box drying method is the slowest. Generally, under the temperature of 105°C, the baking time requires at least 12 hours. The alcohol burning method is also relatively fast, but it also needs an analytical scale and consumes a great quantity of fuel; at the same time, there are certain limitations in its application. Generally, the alcohol burning method is suitable for siliceous soil testing, but it is apt to bring about great errors in clay soil testing.

In short, as of the present, of all the methods in testing water content there is none that uses only simple instruments and equipment and can accurately determine water content within a relatively short time, especially the exact water content in organic soil and coal clay soil.

Consequently, in 1959, a new method was developed. This method is based on the baking box principle. It uses simple equipment, which collects and condenses all vapors that have been evaporated from the soil sample undergoing the baking process. The amount of water condensed from the vapors is weighed and results have been satisfactory.